

FILE 'BIOSIS, MEDLINE, EMBASE, EMBAL, SCISEARCH, BIOTECHDS, CAPLUS'
ENTERED AT 15:42:01 ON 17 AUG 2000

L1 183136 S **SOYBEAN?**
L2 7358 S L1 AND (**NUCLEIC? OR DNA**)
L3 2 S L2 AND (**TRNA()REDUCTASE?**)
L4 1 DUP REM L3 (1 DUPLICATE REMOVED)
L5 12691 S **MAIZE** AND (**NUCLEIC? OR DNA**)
L6 0 S L5 AND ((**T()RNA()REDUCTASE**) OR (**TNRA()REDUCTASE?**))
L7 0 S L5 AND ((**T()RNA()REDUCTASE**) OR (**TRNA()REDUCTASE?**))

L4 ANSWER 1 OF 1 MEDLINE DUPLICATE 1

ACCESSION NUMBER: 1999137912 MEDLINE

DOCUMENT NUMBER: 99137912

TITLE: Expression of a **soybean** gene encoding the
tetrapyrrole-synthesis enzyme glutamyl- **trna**
reductase in symbiotic root nodules.

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ENTRY MONTH: 199906

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AB Heme and chlorophyll accumulate to high levels in legume root nodules and in photosynthetic tissues, respectively, and they are both derived from the universal tetrapyrrole precursor delta-aminolevulinic acid (ALA). The first committed step in ALA and tetrapyrrole synthesis is catalyzed by glutamyl- **trna reductase** (GTR) in plants. A

soybean (Glycine max) root-nodule cDNA encoding GTR was isolated by complementation of an Escherichia coli GTR-defective mutant for restoration of ALA prototrophy. Gtr mRNA was very low in uninfected roots but accumulated to high levels in root nodules. The induction of Gtr mRNA in developing nodules was subsequent to that of the gene Enod2 (early nodule) and coincided with leghemoglobin mRNA accumulation. Genomic analysis revealed two Gtr genes, Gtr1 and a 3' portion of Gtr2, which were isolated from the **soybean** genome. Rnase-protection analysis using probes specific to Gtr1 and Gtr2 showed that both genes were expressed, but Gtr1 mRNA accumulated to significantly higher levels. In addition, the qualitative patterns of expression of Gtr1 and Gtr2 were similar to each other and to total Gtr mRNA in leaves and nodules of mature plants and etiolated plantlets. The data indicate that Gtr1 is

universal for tetrapyrrole synthesis and that a Gtr gene specific for a tissue or tetrapyrrole is unlikely. We suggest that ALA synthesis in specialized root nodules involves an altered spatial expression of genes that are otherwise induced strongly only in photosynthetic tissues of uninfected plants.

TI Expression of a **soybean** gene encoding the tetrapyrrole-synthesis enzyme glutamyl- **trna reductase** in symbiotic root nodules.

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CT . . .

*Aldehyde Oxidoreductases: GE, genetics

Aldehyde Oxidoreductases: ME, metabolism

Amino Acid Sequence

Aminolevulinic Acid: ME, metabolism

Base Sequence

Chlorophyll: ME, metabolism

DNA, Complementary: GE, genetics

DNA, Plant: GE, genetics

Escherichia coli: EN, enzymology

Escherichia coli: GE, genetics

Gene Expression Regulation, Enzymologic

Gene Expression Regulation, Plant

. . . metabolism

Pyrroles: ME, metabolism

RNA, Messenger: GE, genetics

RNA, Messenger: ME, metabolism

RNA, Plant: GE, genetics

RNA, Plant: ME, metabolism

*Soybeans: EN, enzymology

*Soybeans: GE, genetics

Soybeans: ME, metabolism

Symbiosis

CN EC 1.2. (Aldehyde Oxidoreductases); EC 1.2.1.- (glutamyl **trna reductase**); 0 (DNA , Complementary); 0 (DNA , Plant); 0 (Pyrroles); 0 (RNA, Messenger); 0 (RNA, Plant)